ALTERING A DISPLAY ON A VIEWING DEVICE BASED UPON A USER CONTROLLED ORIENTATION OF THE VIEWING DEVICE

TECHNICAL FIELD

The invention relates generally to a controlling a display of an electronic image viewing device and more particularly to a system, method and article of manufacture for altering a display on a viewing device based upon a user controlled orientation of the viewing device.

BACKGROUND

Computing systems are routinely used to display images of objects for a wide variety of purposes. Typically, these images are 2D images that present a static representation of an object. Many applications that use such images of objects find 2D static images less than desirable as they do not present a complete representation of the object to the view. For example, a buyer of watches shopping over the Internet may wish to see the watch from different perspectives to see how the face of the watch appears when reading the displayed time as well as to see how thick the watch is as it is worn on a wrist.

Image display systems have also been developed to allow a user to pan and scroll around an object to see the object from differing perspectives. Such systems typically provide a user with a flat, 2D image that provides a panoramic view of all sides of an object while allowing a user to see a portion of the image as if the user was rotating the object. Such systems are an improvement over the flat 2D image of an object; however, these images still do not provide a true perspective view of the object in a 3D concept.

When a user views items like a watch, a user would like to see the object as if it was located within a specimen box. In such a system, the user may see different perspectives of the item by "changing the orientation of the box" to obtain a different view of the object within the box. This approach will address the need to provide a 3D perspective of the item within the confines of a 2D window into the box and thus address limitations existing in earlier image presentation systems.

SUMMARY

The present invention relates to a method, apparatus, and article of manufacture for altering a display on a viewing device based upon a user-controlled orientation of the viewing device. A system in accordance with the principles of the present invention includes a system for altering a computer generated image of an object displayed upon a display device. The system includes a display device orientation measurement module for obtaining a measure of a spatial orientation of the display device and a hand-held processing module for generating the computer generated image of an object. The computer generated image of the object is generated using the measurements of the spatial orientation of the display device to determine a displayed orientation of the object.

Another aspect of the present invention is a computer implemented method, and corresponding computer program data product, for altering a computer generated image of an object displayed upon a display device where the display device has a display device orientation measurement module for obtaining a measure of a spatial orientation of the display device. The method obtains a set of orientation measurements for the display device from the display device orientation measurement module, generates a transformation matrix using the set of orientation measurements for use in generating the computer generated image of an object, and applies the transformation matrix to all visible points within the computer generated image of an object.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and form a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to accompanying descriptive matter, in which there are illustrated and described specific examples of an apparatus in accordance with the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a user of a hand-held computing device to altering an image displayed upon the hand-held computing device according to one embodiment of the present invention.

FIG. **2** illustrates geometry for an object projected onto a screen of a hand-held computing device appearing to display a solid object within its physical dimensions according to one possible embodiment of the present invention.

FIG. **3** illustrates a hand-held computing device appearing to display a solid object within its physical dimensions according to another embodiment of the present invention.

FIG. **4** illustrates a hand-held computing device appearing to display a solid object within its physical dimensions at an altered orientation according to an example embodiment of the present invention.

FIG. **5** illustrates a hand-held computing device appearing to display a solid object within its physical dimensions at an altered orientation and having a different user orientation relative to the computing device according to another example embodiment of the present invention.

FIG. **6** illustrates a hand-held computing device appearing to display a solid object within its physical dimensions at an additional altered orientation and having a different user orientation relative to the computing device according to another example embodiment of the present invention.

FIG. **7** illustrates an exemplary computing system that may be used to support various computing system that are part of example embodiments of the present invention.

FIG. **8** illustrates a block diagram for an image manipulation and display processing system according to an embodiment of the present invention.

FIG. **9** illustrates an operational flow for an image manipulation and display processing system according to yet another example embodiment of the present invention.

DETAILED DESCRIPTION

The present invention relates to a system, method and article of manufacture for altering a display on a viewing device based upon a user controlled orientation of the viewing device.

FIG. **1** illustrates a user of a hand-held computing device to altering an image displayed upon the hand-held computing device according to one embodiment of the present invention. A user holds a hand-held computer **100**, such as a personal digital assistant (PDA) device like a Pocket PC computer or a pen-based Tablet PC computer, that displays a 3D image of an object **101**. As the user changes the